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# A NEW CRAYFISH (DECAPODA: CAMBARIDAE) FROM SOUTHEASTERN TEXAS

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*Abstract.*—*Procambarus* (*Ortmannicus*) *zonangulus* is described from Jefferson, Hardin, and Orange counties Texas. It may be distinguished from its closest relatives: *P.* (*O.*) *texanus* Hobbs, *P.* (*O.*) *lecontei* (Hagen), and *P.* (*O.*) *geminus* Hobbs by the attenuated distal part of the first pleopod of the male and a strong cephalomesial shoulder situated proximal to the caudodistally disposed terminal elements.

Some years ago one of us (HHH, Jr) became aware of the variation that exists in populations of crayfishes that were being identified as members of *Procambarus* (*Ortmannicus*) *acutus acutus* (Girard, 1852), and that opinion was stated in the most recent checklist of the American crayfishes (Hobbs 1989). With the accumulation of collections of these crayfishes from Maine to Mexico and northward to Minnesota, the two of us began a study of the cluster of species currently included in the "complex."

The description of this crayfish, while premature in terms of the scope of our project, is offered to enable David L. Bechler, of Lamar University, Beaumont, Texas, and the late Xuehuai Deng of East China Normal University, Peoples' Republic of China, to associate the results of their studies with a taxon that will be employed in our revision. A review of the literature involving this crayfish, a summary of its range, and geographic variations are anticipated to be included in our study of the complex.

## *Procambarus* (*Ortmannicus*) *zonangulus*, new species
Fig. 1, Table 1

*Diagnosis.*—Body pigmented, eyes well developed. Rostrum of adults with or without minute marginal tubercles but lacking median carina. Carapace with cervical tubercle scarcely larger than others in row on caudoventral flank of cervical groove. Areola 13.1 to 29.0 (mean 19.15 ± 3.89; $n$ = 42) as long as wide, constituting 32.0 to 37.1 (mean 33.86 ± 1.17; $n$ = 42) percent of total length of carapace and 41.0 to 46.8 (mean 42.79 ± 1.22; $n$ = 42) percent of postorbital length. Suborbital angle very weak and obtuse; postorbital ridges with or without inconspicuous cephalic tubercle; hepatic area tuberculate; branchiostegal spine small and acute. Antennal scale approximately twice as long as broad, widest slightly distal to midlength. Ischia of third and fourth pereiopods with simple hooks, hooks of third distinctly overreaching basioischial articulation and lacking opposing tubercle on basis, that of fourth almost attaining articulation and not opposed by tubercle on basis; coxa of fourth pereiopod with strong caudomesial boss, that of fifth much smaller and flattened. First pleopods of first form male reaching coxae of third pereiopods, symmetrical, and conspicuously tapering distally; cephalomesial margin with well developed, rounded hump projecting cephalomesially. Terminal elements consisting of: (1) tapering acute mesial process directed caudodistally and inclined laterally; (2) cephalic process, obscuring central projection in cephalic aspect, corneous, acute, tapering from broad base, inclined mesially, and directed caudally, its apex lying mesial to central projection; (3) caudal element consisting of corneous, tapering, acute caudal

process lying almost against caudal surface of central projection and comparatively inconspicuous, non-corneous, setiferous caudal knob at lateral base of cephalic process; and (4) corneous central projection, largest of corneous terminals, inclined mesially and tapering to subacute apex which directed caudodistally and slightly laterally. Annulus ventralis more than twice as broad as long, dextral half elevated little more than sinistral; sinus originating on median line, disappearing beneath dextral wall and emerging on caudal flank of dextrally oriented tongue near midlength where crossing median line and turning almost caudally before forming arc and extending caudomesially onto conspicuous posteromedian prominence and terminating before reaching caudal extremity of latter. Sternum immediately anterior to annulus strongly cleft and multituberculate. Unadorned postannular sclerite approximately half width of annulus, subtriangular. First pleopods present in female.

*Holotypic male, form I.*—Cephalothorax (Fig. 1a, m) ovate in section, taller than broad. Abdomen narrower than thorax (17.1 and 20.5 mm). Greatest width of carapace slightly less than height at caudodorsal margin of cervical groove. Areola 20.4 times as long as wide with no more than 1 punctation in narrowest part. Cephalic section of carapace 1.9 times as long as areola, length of latter 34.0% of entire length of carapace (42.6% of postorbital carapace length). Surface of carapace punctate dorsally, granulate to tuberculate laterally. Rostrum slightly deflected ventrally with converging slender margins, acute apex of short acumen reaching midlength of ultimate segment of antennular peduncle; minute marginal tubercles marking base of acumen; dorsal surface concave with many fine setiferous punctations. Subrostral ridges evident in dorsal aspect for short distance anterior to caudal margin of orbit. Postorbital ridges well developed, grooved dorsolaterally and bearing small acute tubercle at cephalic extremities.

Table 1.—Measurements (mm) of *Procambarus* (*O.*) *zonangulus*.

| | Holotype | Allotype | Morphotype |
|---|---|---|---|
| Carapace: | | | |
| Entire length | 42.0 | 49.8 | 39.0 |
| Postorbital length | 33.6 | 40.0 | 30.2 |
| Width | 20.5 | 24.5 | 19.5 |
| Height | 21.0 | 24.1 | 18.3 |
| Areola: | | | |
| Width | 0.7 | 1.0 | 1.0 |
| Length | 14.3 | 17.6 | 13.1 |
| Rostrum: | | | |
| Width | 7.0 | 9.2 | 6.9 |
| Length | 10.5 | 11.6 | 10.6 |
| Right chela* | | | |
| Length, palm mesial margin | 16.0 | 12.5 | 12.1 |
| Palm width | 12.5 | 13.5 | 8.4 |
| Length, lateral margin | 48.7 | 40.5 | 35.0 |
| Dactyl length | 29.2 | 25.0 | 20.2 |
| Abdomen: | | | |
| Width | 17.1 | 21.9 | 15.8 |
| Length | 42.1 | 48.2 | 40.0 |

* Left chela in morphotype.

Suborbital angle very small and obtuse. Branchiostegal spines small. Cervical spines represented by small acute tubercles scarcely larger than neighboring ones on caudal flank of cervical groove.

Abdomen (Fig. 1j) subequal in length to carapace. Pleura of third through fifth segments subtruncate to rounded with caudoventral extremities subangular on third and fourth. Cephalic section of telson with 3 spines in each caudolateral corner, middle one in both clusters movable; caudal margin of caudal section with shallow median excavation. Cephalic lobe of epistome (Fig. 11) ovate with elevated free margins; central area subplane and sparsely punctate; distinct anteromedian fovea present on main body. Ventral surface of proximal podomere of antennular peduncle with spine slightly proximal to midlength. Antenna with small spiniform tubercles on basis and

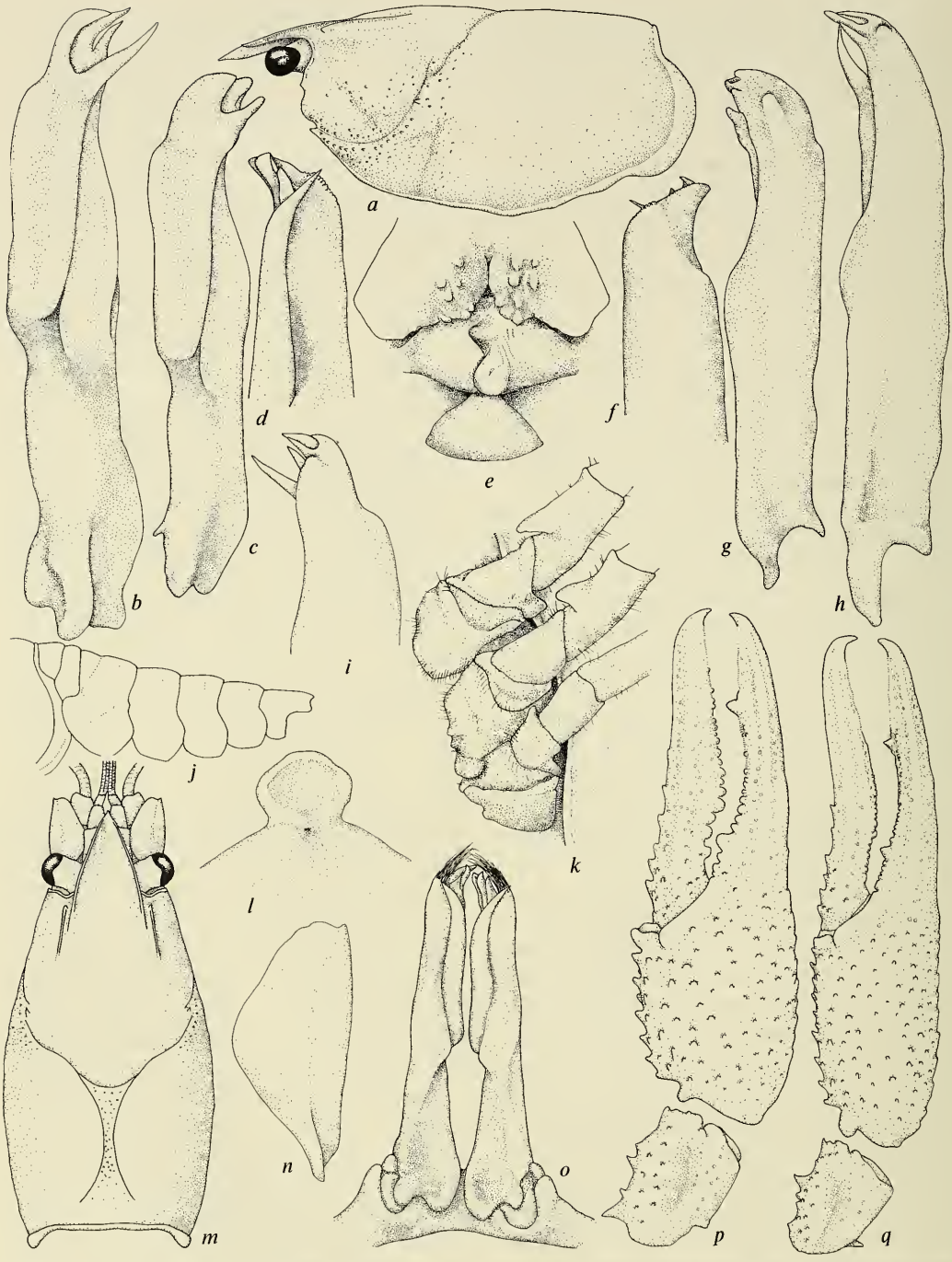


Fig. 1. *Procambarus* (*Ortmannicus*) *zonangulus* (all from holotype except c and g from morphotype, e and p from allotype, and o from paratypic first form male): a, Lateral view of carapace; b, c, Mesial view of first pleopod; d, Caudal view of distal part of first pleopod; e, Annulus ventralis and adjacent sternites; f, Cephalic view of distal part of first pleopod; g, h, Lateral view of first pleopod; i, Caudolateral view of distal part of first pleopod; j, Lateral view of abdomen; k, Proximal podomeres of third, fourth and fifth pereiopods; l, Epistome; m, Dorsal view of carapace; n, Antennal scale; o, Caudal view of first pleopods; p, q, Dorsal view of distal podomeres of cheliped.

ischium; flagella overreaching caudal margin of telson. Antennal scale (Fig. 1n) 2.2 times as long as broad, widest slightly distal to midlength; greatest width of lamella almost twice width of thickened lateral part.

Third maxilliped extending cephalically to level of ultimate podomere of antennule; ischium not produced distolaterally, its ventral surface densely studded with plumose setae.

Right chela (Fig. 1q) subovate in cross section, not strongly depressed. Mesial surface of palm with row of 8 tubercles subtended dorsally by additional row and ventrally by only few tubercles. Entire palm moderately tuberculate, but ventrolateral tubercles much reduced and some replaced by punctations. Dorsal and ventral longitudinal ridges scarcely evident on either finger. Opposable surface of fixed finger with dorsally situated row of 24 (32 on left) tubercles along proximal three-fifths and lower row of 14 (15 on left), one of which much larger than other tubercles on finger; broad band of minute denticles situated between rows of tubercles and extending to base of corneous tip of finger; except for few tubercles proximoventrally, finger otherwise smooth except for longitudinal rows of setiferous punctations. Opposable margin of dactyl with upper row of 32 (29 on left) tubercles on proximal three-fifths and lower row of 17 (15 on left); broad band of minute denticles present between rows and extending distally to base of corneous tip of finger; dorsal and ventral surfaces with few tubercles in basal portion, otherwise with few longitudinal rows of setiferous punctations; mesial surface of finger with row of 6 (4 on left) tubercles along proximal fourth followed distally by row of setiferous punctations reaching base of corneous tip. Carpus of cheliped longer than broad with prominent oblique furrow dorsally, tuberculate mesially and dorsomesially; mesial surface with 3 (2 on left) tubercles larger than others, two near midlength and one distomesially; ventral surface with usual 2 tubercles on distal margin. Merus tuberculate dorsally, distomesially, and ventrally; 2 premarginal tubercles larger than others on dorsodistal surface; ventral surface with mesial row of 16 (15 on left) tubercles and lateral one of 14 (13 on left). Ischium with ventromesial row of 4 tubercles.

Hooks on ischia of third and fourth pereiopods (Fig. 1k) simple, that on third overreaching basioischial articulation, that on fourth almost reaching articulation and unopposed by prominent tubercle on corresponding basis. Coxa of fourth pereiopod with prominent subvertically oriented caudomesial boss; that of fifth with smaller one strongly compressed in longitudinal plane of body (when legs positioned at right angles to longitudinal axis). Sternum between third, fourth, and fifth pereiopods comparatively deep with mat of plumose setae extending mesially from ventrolateral margins.

First pleopods (Fig. 1b, d, f, h, i, o) as described in "Diagnosis." Uropod with both lobes of basal podomere bearing small acute spine; both rami with distolateral spines, and distomedian spine on mesial ramus situated distinctly proximal to subtruncate distal margin.

*Allotypic female.*—Differing from holotype, except in secondary sexual characters, as follows: acumen of rostrum, marked basally by sudden but shallow contraction of rostral margins reaching base of ultimate podomere of antennular peduncle; tubercles at cephalic extremities of postorbital ridges rounded; suborbital angle vestigial; branchiostegal spine tuberculiform; pleura of third through fifth abdominal segments angular posteroventrally; cephalic lobe of epistome more nearly subtriangular with anteromedian prominence; mesial surface of palm of chela (Fig. 1p) with row of 6 (7 on left) tubercles; opposable surface of fixed finger with single row of 13 (left with 10 tubercles, latter with additional large one at base of distal fourth; opposable margin of dactyl with single row of 14 (13 on left) tubercles and mesial margin with row of 5; ventral surface of merus of cheliped with mesial row of 14 (13 on left) tubercles and

lateral row with 15 (13 on left). Ventromesial surface of ischium with 4 (3 on left) tubercles.

Annulus ventralis (Fig. 1e) as described in "Diagnosis."

*Morphotypic male, form II.*—Differing from holotype in following respects: greatest width of carapace slightly more than height at caudodorsal margin of cervical groove; narrowest part of areola with 2 punctations; acumen reaching base of ultimate segment of antennular peduncle; marginal tubercles at base of acumen much more strongly developed; cephalic section of telson with 2 spines in each caudolateral corner, mesial pair movable; antennal scale with acute distolateral spine and broadest slightly proximal to midlength; longitudinal ridges on fixed finger of chela more distinct, opposable margin with dorsal row of 14 tubercles and ventral row of only 3; opposable margin of dactyl with corresponding rows of 22 and 11 tubercles, mesial surface with row of 4 tubercles along proximal fourth; ventral surface of merus of cheliped with mesial row of 17 tubercles and lateral one of 14; ischium of cheliped with ventromesial row of 5 tubercles; hooks on ischia of third and fourth pereiopods much smaller, neither overreaching articulation with corresponding ischium; bosses on coxae of fourth and fifth pereiopods weaker. First pleopod (Fig. 1c, g) with apical section much more stocky and while all terminal elements described for holotype present, all reduced and none corneous.

*Type locality.*—Dishman Road at Tram Road north of Meeker, Jefferson County, Texas 30°7′N, 94°15′W). Roadside ditch, occasionally drying, with sedges and grasses, bordered by *Salix niger.*

*Disposition of types.*—The holotype, allotype, and morphotype (USNM 220297, 220298, and 220299, respectively) are deposited in the National Museum of Natural History, Smithsonian Institution, as are the paratypes, consisting of 24 ♂ I, 2 ♂ II, 8 ♀, 2 j♀.

*Specimens examined.*—(1) Type locality: 16 ♂ I, 7 ♀, 27 May 1989, coll. Edmund Farmer and David L. Bechler. (2) Massey Lake Slough and unnamed slough, Hardin County, Texas (Lat. 30°7′, Long. 94°12′), 3 ♂ I, 1 ♀, 2 j♀, 12 May 1989, coll. DLB, Lynn Sadler, Roy King. (3) The Crawdad Farm, Mauriceville, Orange County, Texas: 5 ♂ I, 27 May 1989, coll. Boyce and Sharon Ward. (4) Pond adjacent to Neches River at Beaumont, Orange County, Texas: 1 ♂ I, 3 ♂ II, 1 ♀, 26 Sept 1953, coll. R. J. Baldauf.

*Relationships.*—*Procambarus* (*Ortmannicus*) *zonangulus* has its closest affinities with *P.* (*O.*) *texanus* Hobbs (1971), which has been reported from a single locality in Bastrop County, Texas. More distant affinities exist with *P.* (*O.*) *lecontei* (Hagen, 1870) and *P.* (*O.*) *geminus* Hobbs (1975). Among the features in which it differs from the latter two are a much narrower, less densely punctate areola, a rostrum with more strongly convergent margins and weaker marginal spines; the first pleopods are symmetrical and, except for the caudal process, the terminal elements of the first pleopod of the first form male are directed caudally at approximately right angles to the main shaft of the appendage. This crayfish differs from *P.* (*O.*) *texanus* chiefly in features of the first pleopod, especially in the first form male: the distal part of the pleopod is strongly tapering; the cephalomesial shoulder proximal to the terminal elements is much more strongly developed; the central projection and caudal process are proportionally longer, and more tapering.

*Etymology.*—Zona (L.) = belt + Angulus (L.) = bay or gulf, noting its range in the gulf coastal area of the United States.

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## Literature Cited

Girard, Charles. 1852. A revision of the North American Astaci, with observations on their habits and geographical distribution.—Proceedings of the Academy of Natural Sciences of Philadelphia 6:87–91.

Hagen, Hermann A. 1870. Monograph of the North American Astacidae.—Illustrated Catalogue of the Museum of Comparative Zoology at Harvard College 3:viii+109 pp.

Hobbs, Horton H., Jr. 1971. New crayfishes of the genus *Procambarus* from Alabama and Texas (Decapoda, Astacidae).—Proceedings of the Biological Society of Washington 84:81–94.

———. 1975. New crayfishes (Decapoda: Cambaridae) from the southern United States and Mexico.—Smithsonian Contributions to Zoology 201:1–34.

———. 1989. An illustrated checklist of the American crayfishes (Decapoda: Astacidae, Cambaridae and Parastacidae).—Smithsonian Contributions to Zoology 480:iii + 236 pp.

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